CLAIMS

What is claimed is:

1. A method for forming tools having a smooth surface finish comprising the steps of:

providing a high speed rotational processing apparatus having an outer vessel and at least one inner vessel;

placing a plurality of tools into the inner vessel, each tool being spaced apart from an adjacent tool;

adding a first abrasive media into the inner vessel;

rotating the inner vessel in a first stage at high speed relative to the outer vessel such that the inner vessel rotates about its axis of rotation and about the axis of rotation of the outer vessel, the high speed rotation causing the first abrasive media to repeatedly contact the surface of the tools, the contact producing material removal of the surface of the tools;

removing the first abrasive media from the inner vessel;

adding a second abrasive media into the inner vessel;

rotating the inner vessel the vessel in a second stage at high speed relative to the outer vessel such that the inner vessel rotates about its axis of rotation and about the axis of rotation of the outer vessel, the high speed rotation causing the second abrasive media to repeatedly contact the surface of the tools, the contact producing polishing of the surface of the tools; and

removing the tools from the inner vessel.

2. A method according to claim 1 wherein the step of placing a plurality of tools into the inner vessel involves mounting the plurality of tools to a fixture so that each tool is spaced from an adjacent tool, and placing the fixture into the vessel.

3. A method according to claim 2 wherein the step of placing the fixture into the vessel involves mounting the fixture to the vessel wall.

4. A method according to claim 2 wherein the step of rotating the inner vessel in the first stage involving rotating the inner vessel at a first stage speed and for a first period of time, and wherein the step of rotating the inner vessel in the second stage involving rotating the inner vessel at a second stage speed and for a second period of time.

5. A method according to claim 4 wherein the second stage speed is less than the first stage speed for at least part of the second period of time.

6. A method according to claim 5 wherein the second stage speed is initially at approximately the same speed as the first stage speed and then is reduced to a speed that is less than the first stage speed.

7. A method according to claim 4 wherein the inner vessel in the first stage rotates at a speed above approximately 100 RPM and the inner vessel in the second stage rotates at two speeds, at least one of which is above 100 RPM.

8. A method according to claim 7 wherein the inner vessel in the first stage rotates at a speed of approximately 295 RPM, and wherein the inner vessel in the second stage rotates at a speed of approximately 295 RPM for a part of the second period of time and at a speed of approximately 200 RPM for another part of the second period of time.

9. A method according to claim 7 wherein the inner vessel in the first stage rotates at a speed of above approximately 250 RPM for at least

approximately 15 minutes, and wherein the inner vessel in the second stage rotates at a speed above approximately 250 RPM for at least approximately 15 minutes, then at a speed below 250 RPM for at least approximately 15 minutes, and wherein the media in the first stage includes silicon carbide and the media in the second stage includes aluminum oxide.

10. A method for forming tools having a smooth surface finish comprising the steps of:

providing a high speed rotational processing apparatus having an outer vessel and at least one inner vessel;

placing a plurality of tools into the inner vessel, each tool being spaced apart from an adjacent tool so as not to touch during rotation;

adding a first abrasive media into the inner vessel;

rotating the inner vessel in a first stage at a first rotational speed relative to the outer vessel such that the inner vessel rotates about its axis of rotation and about the axis of rotation of the outer vessel, the rotation causing the first abrasive media to repeatedly contact the surface of the tools, the contact producing material removal of the surface of the tools;

removing the first abrasive media from the inner vessel;

adding a second abrasive media into the inner vessel, the second abrasive media being different from the first abrasive media;

rotating the inner vessel the vessel in a second stage at an initial speed relative to the outer vessel such that the inner vessel rotates about its axis of rotation and about the axis of rotation of the outer vessel for a initial period of time,

slowing the rotation of the inner vessel in the second stage to a second speed and rotating the inner vessel at that speed for a second period of time, the second speed being less than the initial speed and the speed of rotation during the first stage; and

removing the tools from the inner vessel.

11. A method according to claim 10 wherein the step of placing a plurality of tools into the inner vessel involves mounting the plurality of tools to a fixture so that each tool is spaced from an adjacent tool, and placing the fixture into the vessel.

12. A method according to claim 11 wherein the inner vessel in the first stage rotates at a speed above approximately 100 RPM, and wherein the initial speed of the inner vessel in the second stage rotates above 100 RPM.

13. A method according to claim 12 wherein the inner vessel in the first stage rotates at a speed of approximately 295 RPM, and wherein the initial speed of the inner vessel in the second stage is approximately 295 RPM and the second speed of the inner vessel in the second stage is approximately 200 RPM.

14. A method according to claim 12 wherein the inner vessel in the first stage rotates at a speed above approximately 250 RPM for at least approximately 15 minutes, and wherein the initial speed of the inner vessel in the second stage is above approximately 250 RPM for at least approximately 15 minutes, then reduced to a speed below 250 RPM for at least approximately 15 minutes, and wherein the media in the first stage includes silicon carbide and the media in the second stage includes aluminum oxide.